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CLAIMS

1. A fluid-working machine with variable volume working chambers, each of which is connected to a fluid commutating means which alternately connects the working chamber to either of two fluid manifolds, wherein a valve member is inserted into the flow path between each chamber and the commutating means.

2. A fluid-working machine as claimed in claim 1, wherein the valve member is electronically controlled.

3. A fluid-working machine as claimed in claim 2, wherein a controller for controlling the valve member receives an input signal of the phase angle of a shaft of the machine or at least one electronic pulse per revolution which informs the controller that the shaft is passing a known phase angle.

4. A fluid-working machine as claimed in claim 3, wherein the controller is arranged to choose whether to actuate the valve member, each time the working chamber volume is approaching its minimum, such that the valve is closed at a time close to the time the working chamber begins its expansion stroke, if it is desired to isolate the working chamber from the commutating means.

5. A fluid-working machine as claimed in claim 4, wherein the controller sums the previous flow demand to create a total displacement demand and compares it with the actual displacement through the machine over the same time period to determine the displacement error and the controller chooses either to isolate the working chamber or to leave it active in order to minimise the ongoing accumulated displacement error.

6. A fluid-working machine as claimed in claim 4, wherein the controller reads a demand from an external signal line and decides whether to isolate working chambers, as they reach the minimum volume condition, in order to regulate one of speed, torque, volumetric flow rate, power and volume displaced per revolution.

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7. A fluid-working machine as claimed in claim 4, wherein the controller makes decisions to isolate working chambers on the basis of sensed shaft speed so that the ratio of working cylinders to idle cylinders decreases, according to a pre-determined function, as the machine speeds up, in order to either maintain a constant level of throughput flow or one which rises less quickly than the shaft speed increase would indicate.

8. A fluid-working machine as claimed in claim 3, wherein the machine is arranged to work as a motor, and the controller can choose to close the valve member some fraction of the way into an expansion stroke of the chamber, such that the chamber is connected to the commutating means for only a fraction of the expansion stroke, such that the volume of fluid working to drive the load in that expansion stroke is a fraction of the full geometric displacement of the chamber.

9. A fluid-working machine as claimed in claim 3, wherein the machine is arranged to work as a pump, and the controller can choose to close the valve member some fraction of the way into the expansion stroke of the chamber, such that the chamber is connected to the commutating means for only a fraction of a full working stroke, such that part of an expansion stroke consists of pulling a partial vacuum in the chamber, such that when a next contraction stroke begins, the chamber does not act as a pump immediately but at some fraction of the way into the contraction stroke, such that the contraction stroke displaces only a fraction of the full geometric displacement of the chamber into the commutating means.

10. A fluid-working machine as claimed in claim 3, wherein the controller is operable to reduce the loss of energy in the compressed fluid by closing the valve member just before the chamber reaches its maximum volume condition so that the remaining expansion can de-pressurise the fluid contained within the chamber before the commutating valve port is opened to the low-pressure manifold.